

America, with its frequent changes of administration and its too often objectionable policy of the spoils to the victors, renders such problems as the economic and sanitary disposal of city refuse much more difficult to solve than in the case of the cities of Europe, where the municipal engineering and sanitary staff have much greater influence and powers of control.

(2) Called upon to remedy defects in existing crematories in the United States, Mr. Venable has made a complete study of the principles of design of every type of crematory so far built in the States, and this book is the result. In an introductory chapter the author points out that the crudity of the methods of disposal still in use in many cities is almost incredible, and he traces much of the slow progress of reform in this matter to the frequent changes in the administrative officials. In the second chapter tables are given as to the quantities which have to be collected, and the average composition of the refuse in a few large cities; in four cities in the States the weight per head per annum ranges from 1140 lb. to 1670 lb.

The problem of burning refuse without offence is then taken up, and Mr. Venable insists on the absolute importance of so designing the furnace that a temperature is reached which renders the discharge of odours from the chimney stack impossible. In chapter iv. the various types of crematories are divided up into classes, based on the fact that there is, or is not, some attempt at preliminary drying; each class is then described in some detail, and illustrations are given of a well-known example of each class, and lists of all the patents so far granted in the States for such crematories; the next chapter deals with the cost of working destructors, and the heat available from the products of combustion for steam raising.

In chapter vi. a complete history is given of the building of crematories in the States from 1887, the pioneer year, to the present date, and sectional drawings are reproduced of many of the furnaces which have been put up during that period. Mr. Venable is an advocate for the separate collection of garbage, refuse, and ashes, and, therefore, while quite ready to admit that the destruction of refuse in England, where usually the whole of the refuse is collected in one receptacle, is admirably carried out at the present day, he does not think that the British type of destructor is ever likely to come into extensive use in America; he, however, gives details of some of the tests carried out on Meldrum furnaces in Great Britain. In the last three chapters the materials and methods of construction likely to give the most satisfactory results are discussed, and, lastly, a draft specification is given.

These two books will be extremely interesting to English municipal authorities, because they deal fully with the methods of disposal of city refuse in the United States, methods which differ radically from those in use in our own country, and, while still convinced that we are ahead of our Transatlantic cousins in this important sanitary problem, nevertheless there is much we can learn from them.

SOME RECENT WORKS ON PHYSIOLOGY.

On Carbohydrate Metabolism, with an Appendix on the Assimilation of Carbohydrate into Proteid and Fat, followed by the Fundamental Principles and the Treatment of Diabetes, dialectically discussed. By Dr. F. W. Pavy, F.R.S. Pp. xi+138. (London: J. and A. Churchill, 1906.) Price 6s. net.

The Dynamics of Living Matter. By Prof. Jacques Loeb. (Columbia University Biological Series, No. 8.) Pp. xi+233. (New York: The Columbia University Press; London: Macmillan and Co., Ltd., 1906.) Price 12s. 6d. net.

Geschmack und Geruch. By Dr. Wilhelm Sternberg. Pp. viii+149. (Berlin: Julius Springer, 1906.) Price 4 marks.

DR. PAVY'S new book on carbohydrate metabolism deals with a subject to which he has devoted a long life of study and original research, and his opinions are therefore entitled to the most careful consideration and respect. He treats the subject partly from the physician's point of view, for the disease known as diabetes cannot be properly understood until the nature of the metabolism which the carbohydrates undergo in health is a matter of certain knowledge. Those acquainted with Dr. Pavy's previous writings will be aware that he has never accepted the glycogenic theory of Claude Bernard, and in the present brochure he brings forward fresh evidence of what he regards as its incorrectness. Dr. Pavy also was the first to direct attention to the glucoside nature of the proteids, and this view is also amplified. Most attention, however, will be centred on the new doctrine of absorption he puts forward, and to the important rôle in this process which he assigns to the lymphocytes. He supposes that what first occurs is that these cells assimilate nutrient matter and incorporate it in their protoplasm, and subsequently carry it to the tissues. Among other facts in support of this view he directs attention to the great increase in the lymphocytes of the blood after a meal. One imagines this view will not be immediately accepted, partly because it is doubtful whether the lymphocytes are sufficiently numerous, or capable of sufficiently rapid integration and disintegration to bear the burden of the large amount of material which has to be transported, and partly because the acceptance of such a theory will involve the rejection of much recent physiological work in which it has been shown that the food-proteids are broken down during digestion into the small molecules of the amino-acids of which they are composed. Dr. Pavy has produced an interesting and suggestive book, but he has made no experimental attempt to disprove the new ideas of complete hydrolysis of proteids in the intestine which are rapidly gaining credence.

Prof. Jacques Loeb's book is the outcome of a series of lectures he gave at Columbia University in 1902. He has entitled it the "Dynamics of Living Matter," and it is an attempt to explain the phenomena of life on the basis of physical chemistry. Prof. Loeb has

been an arduous worker at this branch of science, and it will be convenient to have in a compact form the outcome of his numerous fuller publications, which it is the object of this book to present. Prof. Loeb's name is best known in connection with the parthenogenesis which he has artificially produced in unfertilised marine eggs, by altering the saline constituents and other physical conditions of the surrounding water. This subject is here given in its most recent developments, but the book naturally contains a good deal in addition. We may regard the work as a useful counterblast to those who term themselves neo-vitalists. It can hardly be considered the last word on the subject. Physical chemistry in relation to inorganic material is in a state of flux, one theory displacing others with startling rapidity. It is, therefore, a little early to apply it to organic and living substances with any hope of obtaining universal acceptance of the theories put forward. The speculations indulged in are interesting, and the facts will settle down into their proper places later on.

The third book in this physiological batch relates to a small corner of physiological inquiry, namely, taste and smell, and mainly the former. Dr. Sternberg has devoted attention to this sub-branch of a branch of physiology, and has produced a readable pamphlet. It is, however, a little difficult to understand why books should be written with such limited scope, and it is doubtful if they are really needed.

MATTER AND RADIO-ACTIVITY.

The Electrical Nature of Matter and Radio-activity.

By Prof. Harry C. Jones. Pp. ix+212. (London: Archibald Constable and Co., Ltd., 1906.) Price 7s. 6d. net.

THIS book consists of a series of articles, written in semi-popular style, reprinted from the *Electrical Review*. The first third of the book is occupied with the electronic theory of matter, and follows the usual popular lines. The subject is treated only from what may be called the Cavendish Laboratory point of view, and, in fact, we read that we owe the whole electronic conception to Prof. J. J. Thomson. The optical and spectroscopic foundations for the theory are omitted, and the names of Larmor, H. A. Lorentz, and Zeeman are not mentioned.

It is difficult to attempt to review this part of the book, for if the reviewer has interpreted a recent paper by Prof. J. J. Thomson aright, the view that the constituent electrons of an atom are present in sufficient numbers to contribute any appreciable part of its mass appears to have been disproved. Here, however, we read:—

"There is one point at least brought out so clearly that there can scarcely be any question about it, and that is that matter is a pure hypothesis."

And again:—

"The atom according to this theory is *very* complex. Take, for example, the atom of mercury.

NO. 1930, VOL. 74]

This contains somewhat more than 150,000 electrons, and some of the heavier atoms are even more complex."

The author, by thus presenting so dogmatically and literally the speculations which have centred around the electron as the basis of matter, has directed attention away from the solid experimental work on which our knowledge of the nature of electrons rests. It is this work, and not the sweeping electronic hypothesis, which is connected with radio-activity. But for the pioneer work on the ionisation of gases done in the Cavendish Laboratory and elsewhere, the electrical method of radio-active measurement could not have reached its present perfection, and it is safe to say that, deprived of this method, radio-activity would have advanced but slowly. But whether the atom of mercury has 200 or 150,000 electrons is a question which fortunately has nothing to do with the very fundamental and independent conclusions of the nature of matter formed from radio-active evidence.

Radio-activity, the second topic, is started in chapter v., and with the remainder of the work and the mode of treatment no exception can be taken, except that it is not very up-to-date. The last chapter, which is entitled "Most Recent Work in Radio-activity," attempts, however, to accomplish this.

The book as a whole gives a comprehensive and interesting survey of the radio-activity of matter as it is interpreted by the disintegration hypothesis. Perhaps the best chapters are those dealing with the reproduction of radio-active matter and the theory arising therefrom. Here the chemical training and point of view of the author are in evidence, and the significance of the continuous reappearance of the products of change after complete removal by chemical or other means is very clearly brought out.

Attention may be directed to some inaccuracies and errors of minor importance. The author does not seem very clear about the nature and properties of the γ rays. We learn that their power to affect the photographic plate is much greater than that of the β or even the α particles, an error which is frequently repeated. Their origin is ascribed to the *impact* of β rays on solid matter rather than to the acceleration of the β particle during *expulsion*. In the experiment of causing, by means of a glass tube containing radium, a discharge to pass between two points just so far apart that ordinarily the spark fails, most of the ionisation from the glass tube is ascribed to the γ rays. It is safe to say that if the glass were as thick as this the experiment would fail. The statement that the emanation can be condensed at low temperatures like an ordinary gas into a *liquid* is obviously a slip, for a little later we read that no liquid or even mist will be seen. Twice later, however, the statement is repeated, and liquid appears a loose word for non-gaseous. The β rays are ascribed little power of exciting phosphorescence, and the effect on a platino-cyanide screen is said to be greater for α than for β and γ rays.

F. S.